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THE
GEOGRAPHICAL REVIEW

VOL. XXIII JANUARY, 1933 NO. 1

GARDENS OF THE MACKENZIE

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THE two longest river systems of North America are counterparts. The Mississippi runs southward to a tropic sea; the Mackenzie northward to arctic brine. From the source of the Missouri to the Gulf of Mexico the former is 4220 miles long. From the source of the Finlay down the Peace, Slave, and Mackenzie rivers to Mackenzie Bay, on Beaufort Sea, the mileage is 2525. In each case the trunk stream flows through a sedimentary lowland. The drainage basin of the Mississippi comprises 1,244,000 square miles; that of the Mackenzie about 682,000. The former has a latitudinal range of 21 degrees, from near the 50th to the 29th parallel; the latter crosses 16 degrees between the 53rd and 69th parallels.

It would surprise no one to find gardens throughout the length of the more southerly system, but how far down the northern river can fruits and flowers and vegetables be grown? Surely not to its delta, where on July 12, 1789, the explorer of the Mackenzie found frost at a depth of six to eight inches! And yet—but we must not anticipate.

In 1930 the author was commissioned by Dr. E. S. Archibald, Director of Experimental Farms, Dominion Department of Agriculture, to proceed down the Mackenzie River to its mouth, to visit the several experimental substations conducted by the Roman Catholic Missions there, to report upon the advisability of extending experimental work in that field with a view to national stock-taking, as it were, to inquire into the possibilities of interesting the natives in fur farming, and to make a general agricultural reconnaissance of the Mackenzie Basin.

From Beaverlodge in the Upper Peace country transport was by rail 435 miles east-by-southeast to Edmonton; thence 305 miles north-

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FIG. 1

FIG. 2

FIG. 1—Fitzgerald, within a few miles of the sixtieth parallel. View looking north. (Photograph by Royal Canadian Air Force.)
FIG. 2—Simpson, on an island below the confluence of the Liard and Mackenzie. View looking east. (Photograph by Royal Canadian Air Force.)

FIG. 3

FIG. 4

3—Good Hope, on the Mackenzie, within twelve miles of the Arctic Circle. (Photograph by Royal Canadian Air Force.)
r Force4—Aklavik, in the Mackenzie delta, over a thousand miles north of Edmonton. View looking east. (Photograph by Royal Canadian Air Force.)

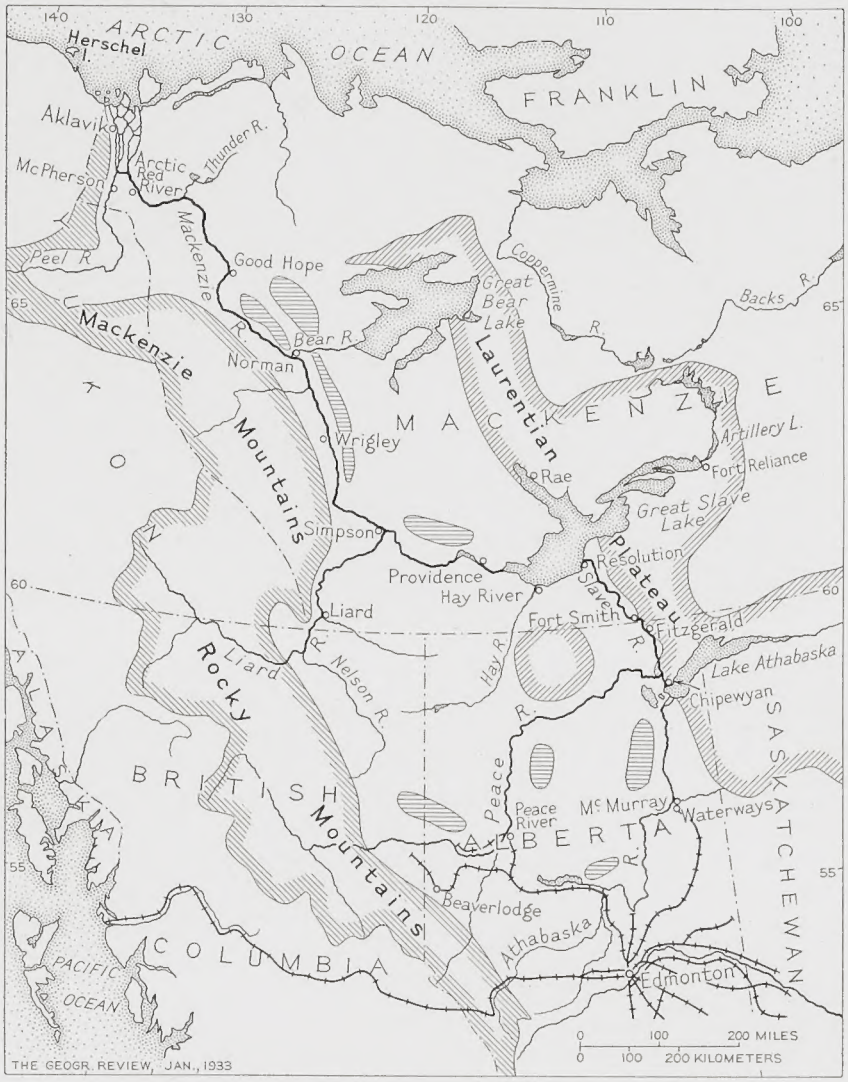

FIG. 5—The Mackenzie Basin showing main physiographical provinces after Charles Camsell and Wyatt Malcolm: The Mackenzie River Basin, *Canadian Geological Survey, Memoir 108*, 1919. On the west is the Cordilleran province; on the east, the Laurentian Plateau; between, the Great Central Plain with surface broken both in the south (Alberta Plateau) and the north (Mackenzie Lowlands) by uplands. Scale of map approximately 1 : 15,000,000.

by-northeast to Waterways, the depot of Fort McMurray, Alberta, on the Athabaska River; thence by seaplane of the Royal Canadian Air Force to Herschel Island, Yukon Territory, in Beaufort Sea. The return trip included a circuit of Great Slave Lake. The total rail mileage was 1480, the air mileage 4015, and the automobile mileage (in vicinity of the Slave River) 100.

Edmonton, capital of Alberta, is 314 miles north of the inter-

national boundary. A few decades ago only a depot of the fur trade, Edmonton today is a city of over seventy thousand and the center of one of the most flourishing agricultural regions of America. From points in Alberta and the "Peace River Block" of British Columbia lying wholly north of Edmonton, 21,545,836 bushels of wheat and 8,746,814 bushels of coarse grains were loaded during the 1931 crop year, while 75,032 head of livestock were shipped during the calendar year.

FIG. 6—The author's home at Beaverlodge in the Peace River district of Alberta, September 17, 1932.

The present agricultural settlement of the Peace, centered some 300 miles northwest of Edmonton, has already won four international championships in wheat, two in oats, and three in peas, besides four reserve championships and many first prizes. A volume might be written about the gardens of the Peace, but space is reserved for the valleys beyond.

AT THE GATEWAY TO THE NORTH

On a bend of the Athabaska River where it turns sharply northward on its last leg to the lake of the same name is the old trading post of Fort McMurray, 220 miles north of Edmonton. Two or three tributaries enter here, and the place seems to receive some extra precipitation. The river-flat site is backed by high wooded hills.

Here the Gordons, William and his sister Christina, have been established more or less permanently since the days of the Klondike rush. On July 2, 1930, their staked marrowfat peas averaged 36 inches in height; three weeks later the same peas averaged 5 feet. Potatoes stood thigh-high in dozens of luxuriant gardens. Cabbages, turnips, and all the usual range of hardy vegetables were incredibly rank. Strawberries were clustered on the vines in Hugh Macdonald's back yard.

FIG. 7—Peas in the garden of Angus Sutherland, McMurray, Alberta, July 23, 1930.

But the show place of McMurray is the flower garden of Cecil Potts. A spruce tree planted twelve years before, when it was 8 or 10 inches high, had attained a height of 21 feet. Birch grows well and is represented by fine specimens. A good lawn had been made from the native turf. The sweet peas were a sensation, while the range of other flowers ran from portulaca to a choice assortment of gladioli (see Fig. 8).

FIG. 8—Flower garden of Cecil Potts, McMurray, July 23, 1930

And yet they were complaining of a dry season at McMurray! All places appear to have their off seasons when visitors happen along. The weather improved after the author's departure. August brought copious rains, and Miss Gordon wrote that when frost caught her scarlet runner beans at the end of August they were 18 feet tall. According to reports the seasons of 1931 and 1932 proved equally favorable.

PRIZE-WINNING WHEAT FROM ATHABASKA

In 1778 Peter Pond is said to have arrived on the Lower Athabaska, presumably towards its delta, and there he planted the first garden in what is now the Province of Alberta. Alexander Mackenzie, finding it a few years later, pronounced it as fine a kitchen garden as he had ever seen in Canada. Nearly a hundred years later the Roman Catholic Mission at Fort Chipewyan was awarded a bronze medal for wheat at the Philadelphia Centennial. Chipewyan is on the north shore of Lake Athabaska, 357 miles north of Edmonton.

Itself established in 1847, the Mission still carries on. In a drained slough between polished rolls of glaciated rock a fine flower and vegetable garden flourished. The vegetables included celery, beans, and

tomatoes. At the end of September 700 sacks of potatoes were harvested from 70 planted. The vines were unhurt by frost and were cut to facilitate the removal of the tubers. As a rule there is some frost in the fore part of September.

The most beautiful garden in Chipewyan was that of Mr. and Mrs. Thomas Woodman. Vines, flowers, lawns, shrubbery, and birch trees embellished a fine home flanked by valley walls of granite. Wild

FIG. 9—One of William Gordon's potato fields, McMurray, July 24, 1930.

cucumber vines shaded the veranda, some on the east wing attaining a height of 24 feet. Intermingled were Japanese hops and tall nasturtiums. Among the flowers unfailing success is met with calendula, lavatera, sweet alyssum, zinnia, kochia, eschscholtzia, mignonette, cornflower, cosmos, petunia, clarkia, godetia, balsam, nasturtium, sweet pea, schizanthus, snapdragon, portulaca, stocks, verbena, African daisy, linum, everlasting, etc. The aster bed was a wonderful sight and was not spoiled with frost until October 16. Even such tender things as nasturtiums and cucumbers were unscathed until October 10. Vegetable successes in 1930 included cucumbers, tomatoes, marrows, and mushrooms.

Radiation of heat from the surrounding rock masses, plus lake influence, probably accounts for the warding off of autumn frost in a latitude 671 miles north of the United States.

On the east side of the Slave River, opposite the Wood Buffalo Park, Charles Hilker grows not only good vegetables, including celery and tomatoes, but in 1931 produced a plot of No. 1 hard wheat. In that year there had been but slight frosts to September 12. Sunflowers were then ripening, the largest being 10 inches across. He had red tomatoes, roses in bloom, and was still eating strawberries.

FIG. 10—Fort Smith, North West Territories. (Photograph by Royal Canadian Air Force.)

At the end of July, 1932, despite a frost on June 21, he had corn in tassel. His flower garden of thirty varieties was a mass of color. Sunflowers volunteering from 1931 were in full bloom. His vegetables were good, and he had tomatoes the size of hens' eggs.

Later he reported that wheat (the early varieties Reward and Garnet) sown May 5 grew 3¼ to 3½ feet tall and, because of blackbirds, was cut August 8 on the green side, yielding at the rate of 31½ bushels an acre (1890 pounds) and showing no sign of frost injury. On August 14 Pickaninny sweet corn had perfect cobs 5½ inches long. Tomatoes and cucumbers ripened. The season had been characterized by light showers of insufficient volume.

THE FARTHEST-NORTH TOWN IN ALBERTA

At the head of the rapids on the Slave River is Fort Fitzgerald, within a few miles of the sixtieth parallel. As we circled over the town a strange sight met our eyes. A mile north, carved out of the poplar bush, was a well-appointed homestead resembling an experimental station. Here were neat plots of wheat and oats from seed supplied from Beaverlodge. On July 3 Steve Yanik's wheat was 23

FIG. 11—Hay River post at the entry of Hay River into Great Slave Lake. View looking northeast by east. (Photograph by Royal Canadian Air Force.)

to 28½ inches tall, oats 23 to 25½ inches. On July 19 the grain was headed, both wheat and oats standing 3 feet, 8 inches. The grain was cut on the green side on August 16 after wind and rain had lodged it badly. The oat straw then averaged 5 feet, 3 inches, the wheat, 5 feet. The wheat graded mostly No. 1 and No. 2 Northern at Edmonton; the oats, 1 C. W. and 2 C. W. (see Figs. 12 and 13).

The garden was equally remarkable. Roses bloomed the year of planting, wintered successfully with protection and bloomed again in 1931. Lilacs, Zumbra cherries, and pin cherries blossomed. Raspberries, gooseberries, strawberries, blackberries, black and red currants all ripened in 1931. Potatoes have been grown at Fitzgerald for forty years, and all the patches observed appeared promising. In 1931 Mr. Yanik reported 920 bushels from 3 acres. In 1932 he produced fine samples of grain.

BEYOND THE SIXTIETH PARALLEL

On a 120-foot bank along the majestic Slave, just below the rapids, is Fort Smith, N. W. T., 446 miles north of Edmonton. A generation

ago Warburton Pike pronounced it the most disreputable establishment he had seen in all the north. Today with its orderly, red-roofed, white-walled buildings it is one of the prettiest towns one would wish to view from the air. Once the southern beach of a much larger Great Slave Lake than now exists, the site of Smith is a sandy soil supporting a native forest growth almost exclusively of jack pine.

The long summer days give an amazing fillip to growth. In July, 1930, corn at Smith was far ranker than on the same date in the Peace. New potatoes were being used on July 21. Two-inch tomatoes were produced from seed sown in the open ground without protection. Seed onions attained a diameter of nearly two inches. Verbena and phlox filled the flower beds until covered with snow about October 9.

The most famous garden of Fort Smith is that of Mrs. L. Conibear, who regularly succeeds with sweet-william, scarlet lychnis, Iceland and California poppy, caragana, bush honeysuckle, Japanese sunflower, Siberian perennial lavatera, larkspur, ribbon grass, gypsophila, pyrethrum, achillea, and columbine. She does not deny that gardening north of sixty has its disappointments. Spring is late, the summer is usually short, and rainfall often scant. In 1930, however, there was still blossom on potato vines until at least September 17, and cellars were stocked with first-quality vegetables. The summer of 1931 proved droughty, but gardens were again fairly good, and a letter dated September 11 reported no hard frost to that date. The season of 1932 was droughty too, and growth was small, except where watering was practiced.

Apple Culture on Great Slave Lake

At McMurray one feels he is getting north, but that is not the north at all—only the gateway. At Fitzgerald and Smith he regards each horticultural success as an amazing triumph over latitude, but he is told that he should see Resolution; they have apple trees there.

Fort Resolution is on the south shore of Great Slave Lake 526 miles almost due north of Edmonton. In front of the Roman Catholic Mission are two seedling apple trees which have been bearing for years. The fruit is small but is used for pickles and jam. Each tree when seen was several inches in trunk diameter, was ten or twelve feet tall, and had hundreds of apples. In 1930 the larger specimens selected made 20 pounds of good jam, and in 1931 a wireless crop report concluded "apples plentiful."

Field and garden crops were good. In 1930 the Mission harvested 775 sacks of potatoes from 70 planted. Cabbage attained an average weight of 15 pounds a head. The early summer of 1931 was less favorable, but from the end of June conditions were excellent except for a hot, dry period in July.

An Old Garden at Hay River

At the entry of Hay River into Great Slave Lake is the old post of Hay River, where the Anglican Church Mission has long had a successful garden. The soil is eighteen inches of black-silt loam overlying sand. Four hundred bushels of potatoes were gathered in 1930 along with a considerable assortment of other vegetables. Tomatoes and celery were notable achievements. Three weeks' time produced fine radishes from a sowing made in hot July weather after a rain.

Half or three-quarters of a mile upstream is the police post, where gardening is ordinarily less successful than near the lake though never without some reward. In 1930 the first killing frost there was September 7, but the flowers planted close to the house were untouched until October 5. Celery has not succeeded; but tomatoes do well, though they have to be ripened indoors.

Hay River is 506 miles north of Edmonton. Spring growth is retarded by latitude and lake influence, though the latter compensates in the autumn. In 1930 ice had not cleared from the shore until June 9, when it was driven back by a south wind. In 1931 the season appears to have been less favorable owing to dry weather in June and July, with cloudy weather in half of August and in September.

Up to about the second week of July conditions were promising in 1932, but from then until about the end of August no rain fell at Hay River. The six weeks of drought coupled with intense heat were hard on vegetables. Cabbage at the Anglican Mission refused to develop during this period but did better subsequently. Cauliflower, strangely enough, produced large, firm heads, which were in constant use after the middle of August. Flowers did well with watering. Fodder corn planted May 26 was 3½ feet high by September 7. The cobs were small with partly developed kernels. Alfalfa, sweet clover, and grasses sown in the spring became from 20 inches to 2 feet in height. Early varieties of wheat (Garnet and Reward) grew about 3½ to 4 feet tall, maturing patchily. Some of the better-matured heads submitted were reasonably well filled. Banner oats were good, and barley was excellent. Sunflowers were not killed until near the end of September. In October Corporal Cook of the Mounted Police submitted excellent samples of grain and told of hyacinths, gladioli, and asters having done well.

Potatoes Double Their Height in a Week

Beyond the embouchure of Hay River the western arm of Slave Lake tapers down into the beginning of the Mackenzie. On its north bank a little below where it assumes river proportions is Providence. A Roman Catholic Mission was founded there in 1862. In 1867, when confederation was being accomplished, Sisters of Charity came

FIG. 12

FIG. 13

FIG. 14

FIGS. 12 and 13—Wheat and oats on Steve Yanik's place at Fitzgerald. Figure 12 was taken July 3, 1930: the wheat was 23 to 28½ inches tall, oats 23 to 25½ inches. Figure 13 shows the same rows 16 days later: some of the wheat was 4 feet, 4 inches tall, the oats about 3 feet, 8 inches.

FIG. 14—John Goodall's potato field at Simpson, July 8.

from Montreal, and gardening has been conducted from about that date. Celery has done well at times and occasionally tomatoes. Corn was in silk on July 17. The Hudson's Bay Company manager had a good potato patch.

On an alluvial island below the confluence of the Liard with the Mackenzie is Simpson, 578 miles north of Edmonton. Cropping has been conducted there for many years. After leaving steelhead one heard reiterated "You should see Simpson." We saw it twice. The growth that occurred in ten days is contrasted pictorially (Figs. 15 and 16).

Domestic livestock was kept as far north as Simpson, and at the Oblate Mission the visitor dined on home-produced eggs, butter, milk, onions, and other local produce. More than 50 acres of land was under crop, and its yield is supplemented by wild hay. Father Robin explained that some gardening and farming efforts have been carried on since 1858 or 1859.

A typical potato plant selected for measurement doubled in height in a week. Potato tubers, carrots, and rutabagas grew very large. The Mission was threshing grain in August. In this and other gardens on the island more than a thousand sacks of potatoes were produced in 1930.

Rev. C. F. Clarke, the Anglican missionary, testified that in ten years he had never seen a failure of the potato crop. His own vines made practically the same growth as those at the Roman Catholic Mission, being 18 to 22 inches on July 17. The writer really could not see that one religion was better for potatoes than the other. One of Mr. Clarke's delphiniums stood 7 feet, 5 inches by July 17. White clover had wintered successfully. The caragana shrub was flourishing. For the second season in ten he ripened tomatoes in the open air. He had also achieved a success in producing winter eggs, using artificial light, heat, and cod-liver oil.

FIG. 15

FIG. 16

FIG. 17

FIGS. 15 and 16—Potato field of the Oblate Mission, Simpson. Potatoes were planted May 20. One staked plant measured 10¾ inches on July 7 (Fig. 15); on July 14, 21½ inches; on July 17 (Fig. 16), about 24 inches.

FIG. 17—Potato garden of the Oblate Mission at Aklavik, July 11, 1930. Potatoes planted June 14 measured 3 to 6 inches. The ground was broken only four years ago.

The best husbandman at Simpson is John W. Goodall, who had farmed for fourteen years at Athabaska Landing, going to Simpson in 1927 with the idea of catering to the local demand for truck. In 1930 his Netted Gem potatoes showed an increase ratio of 25 to 1. Squaw corn produced a mess of roasting ears. Tomatoes ripened in the house all fall. Marrows were raised from seed sown in the open. The first killing frost in 1930 fell on September 24–25.

In 1931 the season was dry, and grasshoppers, a hot-climate pest, multiplied. Yet, with the help of a little irrigation good gardens were again grown. Goodall's experience convinces him that anyone with a small plot of ground can produce more than his household can use of the choicest summer and winter vegetables.

Another garden seen in 1930 had onions growing from seed sown in 1929 and wintering outdoors; sunflower stalks, which afterwards became ten feet tall; and corn, which afforded several feeds of sweet corn on the cob.

Hoppers threatened gravely in 1932; wet weather, however, checked the pest in time, and a bountiful harvest was gathered. Mr. Clarke was using new potatoes eight weeks after the planting of cellar-sprouted sets. In the autumn eight thirty-foot rows yielded eight sacks. By actual weight two rows averaged over 700 bushels an acre. Goodall had 450 bushels an acre from unmanured land given no special cultivation. Despite a frost on September 3 he had garden corn and 40 varieties of flowers. Canary creeper was still blooming on the north side of his house on October 5, while pansy, antirrhinum, phlox, and stocks were still surviving the autumn winds. The settlement produced about 1200 sacks of potatoes in 1932 and is looking to supply the Great Bear Lake mining trade.

Washtubfuls of Tomatoes on the Liard

Unfavorable flying conditions precluded a coveted side trip up the Liard, but several upriver residents were met at Simpson, and astonishing were the experiences related. Their statements were afterwards checked as might be in official quarters.

Martin Gardner is a Norwegian who in 1923 went from a homestead in the Peace to trade on the Nelson, where he remained until 1932, when he headed for Great Bear Lake. In seven years he had never had potatoes frozen until September and sometimes not until October. In the summer of 1925 he stuck tomato seeds in the ground here and there and in the fall had two washtubfuls of ripe tomatoes. He extolled the climate of the Liard as superior to that of the Peace.

Rev. Father J. C. Lefebvre, who is in intimate touch with the Northern Oblate Missions, tells of very successful farming and gardening efforts upriver at Fort Liard and expresses the opinion that

the whole region of the Liard is as favorable for cultivation as the Peace. John A. McDougal, until recently the chief government official resident in the Mackenzie District, was quite as complimentary in his opinion.

Almost certain it is that, unless checked by legislative control, settlement will soon be crossing from the Upper Peace to the headwaters of the Liard, pressing down that river, and probably meeting another vanguard working up from Simpson.

Petroleum and Potatoes

We return to the Mackenzie. Wrigley is situated on the west bank of the river where it speeds through a trough hemmed by low mountain ranges. It is a ramshackle place with a magnificent situation. A fair garden was found at the Hudson's Bay Company post, and wild fruits were laden on July 9.

Where the Bear River pours its cold, clear current into the muddy Mackenzie, Fort Norman, the oil-well town, stands on two benches, one thirty or forty feet above the other. On both levels natural vegetation was rank. On July 15 a stem of grass measured 5 feet tall. Most of this growth had been made since the middle of June.

The Catholic Mission on the upper bench had a fine garden. One patch of potatoes had vines averaging 5½ to 6 inches, and during the next five days they grew an inch a day. At the end of September Father Houssais reported that the summer had been warm and dry. The first frost of two degrees came on August 28; another of two degrees on September 7; but the potato leaves were scarcely touched, being still green and unflattened when the crop was lifted on the twelfth. Some of the tubers were as large as a double fist. One of the turnips weighed 8½ pounds. Many of the carrots were more than a foot in length. Peas matured and began to shell towards the middle of August. The cabbages had enormous leaves but were not too well headed.

In 1931 results were again very favorable, although worms ate the cabbages. Despite a frost at the beginning of June, 1932, potatoes were better than the year before. Cabbages averaged 8 pounds. Peas and lettuce were enjoyed all summer. Norman is 787 miles farther north than Edmonton.

At Norman we met a Swede, Oscar Granath, who lived seventy miles downstream at Oscar Creek. In 1929 he was using potatoes 55 days after planting. Potato seed balls gathered from the 1929 crop produced small tubers. Subsequent reports were that Granath had a wonderful garden in 1930, much better than any at Norman. The following season, he admitted, was not so good, though his potatoes from seed continued to develop well.

FIG. 18—Norman at the junction of the Bear River and Mackenzie. View looking west. (Photograph by Royal Canadian Air Force.)

YIELDS AT GOOD HOPE

Just below the famous Ramparts of the Mackenzie and within twelve miles of the Arctic Circle, Fort Good Hope perches on an abrupt bench some sixty feet high, with a deep slough behind, affording air drainage in nearly all directions. For many years this point supplied the Lower Mackenzie with potatoes. The Roman Catholic Mission was established on its present site in 1862, and potatoes have been grown on the same land almost without fertilizer for about 66 years (Fig. 20).

On the evening of July 12 an impressive sight met the eye. Blossoming potato vines were 20 inches high and a picture of health.

FIG. 19—Arctic Red River, a short distance above the head of the Mackenzie delta. View looking north. (Photograph by Royal Canadian Air Force.)

It was all spade work at Good Hope, there being in 1930 no draft animals north of Simpson except dogs. A large amount of seed is required, but the acre yields are respectable. There were several patches, some not planted under the best of conditions. Also there was a killing frost on August 17, so that the Mission's average potato yield in 1930 was only 393 bushels an acre. They had not been artificially watered.

All the staple vegetables did well, while Reward and Garnet wheat plots seeded May 21 were harvested August 9, slightly on the green side for fear of rain. Two hundred and twenty-five cabbages reached a maximum weight of 12 pounds. Good Hope is 869 miles north of Edmonton.

North of the Circle

Some eighty miles north of the Arctic Circle is Thunder River, a small tributary entering the right bank of the trunk. "Clark's place" furnished on July 13 one of the horticultural surprises of an eye-opening voyage. One thousand two hundred and seventy-seven

FIG. 20—Potatoes and cabbages in the Oblate Mission garden at Good Hope, July 14, 1930. Ramparts of the Mackenzie in the distance.

miles north of the international boundary, carved out of the moss-bedded spruce forest, were two flourishing gardens. The owner had been out with his motor boat gathering blueberries with a picker. On hearing the planes he returned with two pailfuls of ripe berries, remarking that the country was covered with blueberries from end to end. There were also wild raspberries, strawberries, red and black currants, but no saskatoons. For the fourth successive season Clark was gardening successfully, raising potatoes to the size of goose or duck eggs. In 1930 his place was making a wonderful showing. The carrot tops on July 13 stood 6 to 9 inches tall; beets 7 to 9 inches; peas 12 to 24 inches and well podded; Swedes 8 to 15 inches; cabbages 6 to 8 inches; potatoes 7 to 10 inches; beans 6 to 9 inches and ready to blossom; oats and barley 30 inches tall and shooting. Lettuce was being thrown away by the armful. The beans had been covered one night for fear of frost.

In the adjacent thinly wooded muskeg a stick touched frost at 6 to 12 inches. In the garden cultivated for a few years the soil was thawed to a depth of 34 inches. Thunder River is 963 miles north of Edmonton.

The season finished strong. Frost on August 16 damaged only beans and potatoes, which latter nevertheless yielded 370 bushels

an acre although grown from non-sprouted sets. The cabbages all headed well, and fifty weighed more than 8 pounds apiece. The little patch of grain ripened. Clark declared that a garden in that country was worth $500.00 a year to a man with a family.

The next summer was not so favorable. Frost got the beans and potatoes on July 26, but the other vegetables were again productive.

FIG. 21—Vegetable garden of William Clark at Thunder (Travier) River, 80 miles north of the Arctic Circle, July 13, 1930.

Barley from the previous season's crop was seeded May 22, headed July 19, and ripened August 14, growing 34 inches tall. Oats seeded May 22, headed July 23, and ripened August 18 when 46 inches high.

Mr. Clark was afraid to tell about the crop he raised in 1932! Everything except parsnip was immense. From 42 pounds of potatoes cut to one-eye sets he dug 985 pounds, a ratio of 1:23.5. Three sacks averaged half a pound to the tuber. Cabbage from seed sown in the open on May 16 ran from 6 to 14 pounds. Poppy, pansy, dianthus, and sunflower did well. Sweet clover grew 4 feet tall; oats and barley ripened. Splendid samples were forwarded by plane. One of two pumpkins ripened. No frost came till September 5 and then only a light one.

ICE-JAM IRRIGATION AT ARCTIC RED RIVER

With the sun still swinging an hour or so high the planes landed at the mouth of the Arctic Red River twenty-five minutes before midnight on July 10.

"Any gardens here?" was the unexpectant inquiry.

"Sure," answered D. McLeod, "come up and see mine." The garden sloped sharply down from his residence, which stood perhaps

40 feet above the water's edge. True enough, there was the universal patch of potatoes, clean and neat. They had been planted June 4 and were promising a yield. In a little corner at the foot stood a patch of grain planted May 17 and inundated directly afterwards by an ice-jam flood. The irrigation appeared to have done it no harm, for the wheat was 2 feet tall and in the shot blade. The barley measured 2 feet, 9 inches and was heading. Blue joint (*Calamagrostis*) and other grasses stood breast high. Fireweed was rank in full bloom. Wild currants, gooseberries, and raspberries grew luxuriantly. The currants were especially heavily laden. Yet on untilled land the frost had withdrawn but a foot or so, and water trickled in the midnight sun from the northward face of a cellar excavation being made in the frost-bound, peaty soil.

Arctic Red River is an important tributary of the lower Mackenzie. The confluence is 962 miles north of Edmonton.

Rhubarb Pie in the Delta

At 1.30 a. m. of July 11 we landed at Aklavik, flying by mid-evening because it was cooler for the engines—there is really no midnight in early July. Mid-day heat was oppressive.

Aklavik is in the delta. It is about 60 miles from Mackenzie Bay and 1015 miles north of Edmonton. We pictured it as in the bleak tundra country. There, surely, would be no gardens, for was not one assured that the frost never drew out all summer to a greater depth than 6 or 8 inches?

The first surprise was the heat. At 1.30 a. m. we rode 2000 feet in the air with perfect comfort, bareheaded, and lightly clad. The next surprise was the forest, occupying the islands and bordering the river though not reaching far back from it in that latitude. Spruce trees 8 to 10 inches thick were plentiful, with odd specimens 70 or 80 feet tall and up to 18 inches in diameter, it was said.

And behold the ubiquitous potato! Planted June 14 the crop then stood 3 to 6 inches tall, later producing some tubers the size of hens' eggs. In a corner of the garden were rhubarb plants that had overwintered and made stalks big enough to use for pies.

In 1925 Father Trocellier had founded the Mission. The next year ground was broken for a garden. At first it was only 6 or 8 inches through moss to the frost. Radish, lettuce, and potatoes had been planted. The radish did well, but the lettuce was small. The potatoes grew only 6 or 8 inches tall the first year, but tubers the size of walnuts were produced and planted the next season. After that they yielded each year a little more than the seed. Double and single daisies came through one winter without care.

Rose haws, dewberries, and fruiting currants were observed.

Mooseberry and blueberry were said to occur, and gooseberries grew farther east. In autumn the author received seed of crowberries and moss cranberries.

In the unbroken forest frost had drawn to a depth of only 6 or 8 inches, as the explorer of the river had observed 141 years before. On land burned over on the first of June it had drawn 12 inches. In the garden the measuring stick pushed down 24 inches. It had been thus in the Yukon.

J. Parsons, the Hudson's Bay Company manager, said conditions at McPherson, over on the Peel River, were more favorable for gardening than at Aklavik. He had grown lettuce, spinach, radish, and turnip and could produce "tons of them." In 1914 he had seen it 90° F. in the shade at McPherson, at which point wild raspberries, blueberries, and yellowberries were found.

The summer of 1931 was a cold one with bad ice conditions in the sea. Potatoes had been killed August 11 by a frost following a snow storm. The rhubarb, however, grew well. October airmail messages from Aklavik reported success in 1932 with lettuce, carrots, and potatoes, and the author received plump, well ripened samples of barley and oats. Even wheat produced fair-sized kernels although not of milling grade.

No gardens were observed on Herschel Island, but the wild flowers on the hillside were abundant and in mass effects of the richest hues—red, purple, blue, white, and gold. Legumes were considerably in evidence. Grass grows, although not very tall.

Seeking Gardens on Great Bear and Slave Lakes

Inquiry in 1930 failed to reveal any gardening efforts around Great Bear Lake, but in 1931 Hugh S. Spence, of the Department of Mines, Ottawa, found vegetables growing on some raw sand and clay laid bare at Labine Point in the mineralized area east of the lake. Lettuce, radish, carrot, and beet had been planted June 14. The carrots and beets did nothing, but the radish grew and the lettuce cut two or three crops. Unverified newspaper allusions suggest that more ambitious attempts were made in 1932.

At the upper end of the north arm of Great Slave Lake is Fort Rae, 642 miles north of Edmonton, built on bare glacier-polished Laurentian rock. No gardens here surely! Yet as the plane circled over the settlement three very thrifty ones were espied. In depressions near the water the Oblate Mission had literally "made" gardens by carrying in rich soil found in crevices farther back. Representative potato plants found on July 17 measured 13, 14, and 21 inches in height, nearly covering the ground and coming into bloom. Here Father La Perriere has annually raised potatoes, cabbage, lettuce,

beets, carrots, turnips, and peas. After a very light frost the potatoes were lifted September 20, some of them averaging 14 ounces.

Domestic strawberries were one of the surprises. Some plants were flourishing in cannisters on the balcony of a Ukrainian trader's home. Others were growing in the Mission garden.

Unlike most of the river points, Fort Rae was blessed with a still more favorable season in 1931. By the end of September Father La Perriere wrote that only potato leaves had a touch of frost and the crop was better than in 1930. There was "enough lettuce and spinach to feed an army." Mice, however, had eaten the strawberries, root, stem, and leaf, during the preceding winter, leaving wild ones untouched.

Lettuce and Radish for Musk-ox Rangers

No cultivated crops were growing at Reliance at the extreme eastern end of Great Slave Lake, presumably because none had been planted; but 40 miles east, at Artillery Lake out near the edge of the musk-ox preserve (Thelon Game Sanctuary), a Swede had grown lettuce, also radishes an inch in diameter. Oats and wheat headed but failed to ripen.

The author did not visit the east end of Lake Athabaska, but his traveling companions who did so in the companion plane reported potato patches there too. He who would outrun the potato in the North has a long chase.

In relating this tale of horticulture in the Mackenzie Basin one realizes he is countering an instinctive discount of high latitude. Truth is that the ecological influence of latitude is largely offset by declining altitude, by long summer days, by the lowering frost plane as the result of gardening itself, and, shall we add, by montane or oceanic influence?

Three seasons have been reviewed in some detail, the first exceptionally favorable, the second one inclement at the more northerly points. At the worst something is produced. At the best production must be seen to be believed. Factors accounting for the phenomena will be discussed in a future article.